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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/677,309	10/03/2003	Tetsuo Suzuki	243579US0X	9488
22850	7590	07/14/2006	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C.			ARANCIBIA, MAUREEN GRAMAGLIA	
1940 DUKE STREET			ART UNIT	PAPER NUMBER
ALEXANDRIA, VA 22314			1763	

DATE MAILED: 07/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/677,309	Applicant(s) SUZUKI ET AL.	
	Examiner Maureen G. Arancibia	Art Unit 1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 April 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>01/06; 06/06</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. **Claims 4, 6, and 9-13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

Specifically, the Examiner notes Applicant's argument that "alkali" refers to "[a]ny substance that in water solution...has a pH value greater than 7.0,' i.e., a base." However, Claims 4, 6, 9, 12, and 13 each recite "alkali hydroxide(s)." This phrase is very confusing, since if "alkali" were to be interpreted as "basic," as Applicant asserts, rather than as a reference to the "alkali metals," the phrase "alkali hydroxide" would appear to be redundant -- i.e. a hydroxide would already be basic, and would not need to be described as "alkali." Also, the enumeration of various *alkali metal* hydroxides in Claim 13 also makes the use of the term "alkali" very unclear. Further clarification and/or correction are requested.

Claims 10 and 11 are rejected due to their dependence on Claim 6.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 3,923,567 to Lawrence (from Applicant's IDS) in view of U.S. Patent 6,100,167 to Falster et al.

In regards to Claim 1, Lawrence teaches a method of reclaiming silicon wafers that includes a film removal process (Column 5, Lines 52-65), a polishing process (Column 7, Lines 32-38), and a cleaning process (Column 7, Lines 38-40), wherein the method comprises a heating / removal process for heating the silicon wafer (Column 6, Lines 6-33) and for removing the surface part of the silicon wafer (Column 6, Line 49 - Column 7, Line 31), between the film removal process and the polishing process.

Lawrence does not expressly teach that the heating of the silicon wafer is performed at 150-300°C for 20 minutes - 5 hours.

Falster et al. teaches in a method of reclaiming silicon wafers (Column 1, Lines 11-13) a heating / removal process comprising heating the silicon wafer at 100-300°C for a preferred time of several to several tens of minutes up to about 1.5 hours. (Column 3, Line 61 - Column 4, Line 10) These ranges in temperature and time meet the limitations recited in Claim 1.

(The Examiner also observes that Falster et al. (Column 3, Lines 51-60) further teaches that the time is a result-effective variable that affects the diffusion of copper to the surface of the silicon wafer, and is selected in accordance with the heating temperature.)

It would have been obvious to one of ordinary skill in the art to replace the heating step of the heating / removal process taught by Lawrence with the heating step taught by Falster et al. The motivation for making such a modification, as taught by Falster et al. (Column 2, Line 67 - Column 3, Line 50), would have been to diffuse copper to the surface of the silicon wafer without the undesirable copper precipitates that form when the heating is performed at higher temperatures.

In regards to Claims 2 and 3, Lawrence teaches that the heating / removal process can include a mechanical removal process (Column 7, Lines 25-31) and a chemical removal process (Column 6, Line 49 - Column 7, Line 21).

5. Claims 5-8, 10, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lawrence in view of Falster et al. as applied to claim 1 above, and further in view of U.S. Patent 5,932,022 to Linn et al.

The teachings of Lawrence and Falster et al. were discussed above.

In regards to Claims 5 and 6, the combination of Lawrence and Falster et al. does not expressly teach that an immersion process for chemically processing the silicon wafer should be performed in addition to the heating / removal process between the film removal process and the polishing process, or that the processing liquid can be any of the liquids recited in Claim 6.

Linn et al. teaches an immersion process for chemically processing a bare silicon wafer should be performed prior to a heating step 115 (Figure 1), wherein the processing liquid can be a mixed solution of hydrogen peroxide, ammonia, and water (SC-1 cleaning solution; Step 101; Column 3, Lines 13-20), or a mixed solution of

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hydrogen peroxide, hydrochloric acid, and water (SC-2 cleaning solution; Step 109; Column 3, Lines 55-65).

It would have been obvious to one of ordinary skill in the art to modify the combination of Lawrence and Falster et al. to include an immersion process for chemically processing the wafer just before the heating / removal step, with processing liquids taught by Linn et al. The motivation for making such a modification, as taught by Linn et al. (Column 4, Lines 43-49), would have been to perform the heating step on a wafer with a relatively metal-free, hydrophilic surface, such that the finally processed wafer has an increased minority carrier diffusion length.

In regards to Claims 7, 8, 10, and 11, Lawrence teaches that the heating / removal process can include a mechanical removal process (Column 7, Lines 25-31) and a chemical removal process (Column 6, Line 49 - Column 7, Line 21).

6. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lawrence in view of Falster et al. as applied to claim 3 above, and further in view of U.S. Patent 5,837,662 to Chai et al.

The teachings of Lawrence and Falster et al. were discussed above.

The combination of Lawrence and Falster et al. does not expressly teach that the chemical removal step can be performed using alkali hydroxides and/or alkali carbonates.

Chai et al. teaches that a chemical removal step can be performed using alkali hydroxides and/or alkali carbonates. (Column 4, Lines 4-7)

It would have been obvious to one of ordinary skill in the art to use alkali hydroxides and/or alkali carbonates in the chemical removal step taught by the combination of Lawrence and Falster et al. The motivation for making such a modification, as taught by Chai et al. (Column 4, Lines 24-34), would have been that the alkaline bath changes the surface potential of the silicon wafer, causing contaminants to be electrostatically repelled from the surface.

7. Claims 9, 12, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lawrence in view of Falster et al., and further in view of Linn et al. as applied to claims 8 and 11 above, and further in view of Chai et al.

The teachings of Lawrence, Falster et al., and Linn et al. were discussed above.

The combination of Lawrence, Falster et al., and Linn et al. does not expressly teach that the chemical removal step can be performed using alkali hydroxides and/or alkali carbonates, including any of the compounds recited in Claim 13.

Chai et al. teaches that a chemical removal step can be performed using alkali hydroxides and/or alkali carbonates, including sodium or potassium hydroxide or sodium or potassium carbonate. (Column 4, Lines 4-7)

It would have been obvious to one of ordinary skill in the art to use one of the alkali hydroxides and/or alkali carbonates in the chemical removal step taught by the combination of Lawrence, Falster et al., and Linn et al. The motivation for making such a modification, as taught by Chai et al. (Column 4, Lines 24-34), would have been that the alkaline bath changes the surface potential of the silicon wafer, causing contaminants to be electrostatically repelled from the surface.

Response to Arguments

8. Applicant's arguments filed 19 April 2006 have been fully considered but they are not persuasive.

In response to Applicant's arguments against the references individually, specifically that Lawrence alone or Falster et al. alone do not teach the claimed method, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

In regards to Applicant's argument that Lawrence teaches away from the claimed invention, the Examiner must disagree. That Lawrence teaches a *different* way for removing impurities from a wafer, even that Lawrence teaches what Lawrence believes to be the *best* way ("to maximize purifying effectiveness;" Column 4, Lines 21-22) does not mean that Lawrence teaches away from the claimed invention. To make such an argument is again to only attack Lawrence individually where the rejection is based on the combination of Lawrence and Falster et al. The Examiner asserts that one of ordinary skill in the art, informed by Falster et al.'s teaching that a heating / removal process comprising heating the silicon wafer at 100-300°C for a preferred time of several to several tens of minutes up to about 1.5 hours (Column 3, Line 61 - Column 4, Line 10) diffuses copper to the surface of the silicon wafer without the undesirable copper precipitates that form when the heating is performed at higher temperatures (Column 2, Line 67 - Column 3, Line 50) would have been motivated with a reasonable

expectation of success to modify the method as taught by Lawrence to use the heating/removal process taught by Falster et al.

In response to Applicant's argument that there is no suggestion to combine the references, the Examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). The Examiner's position regarding the motivation for combining the references has been set forth above.

In response to Applicant's argument that the claimed immersion process promotes the outer diffusion of Cu during the heat treatment, as well as Applicant's description of other advantages of the claimed reclamation method enumerated on Page 11 of the arguments, the fact that Applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maureen G. Arancibia whose telephone number is (571) 272-1219. The examiner can normally be reached on core hours of 10-5, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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A handwritten signature in black ink, appearing to read "Maureen G. Arancibia", with a stylized flourish at the end.

Maureen G. Arancibia
Patent Examiner
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A handwritten signature in black ink, appearing to read "Parviz Hassanzadeh", with a stylized flourish at the end.

Parviz Hassanzadeh
Supervisory Patent Examiner
Art Unit 1763